Impact of COVID-19 Pandemic on Patients with Non-Communicable Disease: An Observational Cross-Sectional Study at AYUSH Set-Ups of Krishna and Darjeeling District, India

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Abstract

Objective: The objective of this study was to determine the impact of COVID-19 in patients suffering from NCDs in terms of their knowledge, awareness, perception about COVID-19, use of AYUSH immune boosters (AIB), and management of chronic condition during the pandemic. *Method:* During the unlock down period (October 2020), a cross-sectional study was conducted in the Krishna and Darjeeling district of Andhra Pradesh and West Bengal, India. 499 individuals suffering from at least one chronic disease were interviewed using a structured questionnaire. Logistic regression was applied to investigate the relationship of socio-demographic characteristics, AIB, and morbidity with pandemic-related care challenges. Principal component analysis was applied to minimize the dimensionality of factors related to COVID care challenges. *Results:* 499 individuals were surveyed. 91% identified at least three correct COVID appropriate behaviours. 92.2% considered the coronavirus to be a potential threat (mean ± SD: 5.8 ± 2.6). 44.7% and 55.3% lived with one and 2 or more chronic conditions, respectively. Hypertension alone (27.4%) and diabetes with hypertension (33%) were leading presentations. Out of 499, participants, 88.8% had at least one form of AIB. 52% took Ars. alb. with other AIB and 40% took Ars. alb. alone. Only 9 participants were infected with COVID-19. *Conclusion:* In the interest of a densely populated country like India, the inclusion of simple and safe AYUSH measures is realistic, ethical, and cost-effective. AYUSH interventions as COVID-19 prophylactic and treatment as well as integrative care of chronic illnesses such as NCDs are suggested.

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Auswirkungen der COVID-19-Pandemie auf Patienten mit nicht übertragbaren Krankheiten: Eine Querschnitts-Beobachtungsstudie in AYUSH-Einrichtungen in den Distrikten Krishna und Darjeeling, Indien

Schlüsselwörter
AYUSH · COVID-19 · AYUSH-Immunbooster · Indien · Nicht übertragbare Krankheiten

Zusammenfassung
Ziel: Mit dieser Studie sollten die Auswirkungen von CO-VID-19 bei Patienten mit nicht übertragbaren Krankheiten (NÜK) in Bezug auf ihr Wissen und Bewusstsein sowie die Wahrnehmung von COVID-19, die Anwendung von AYUSH-Immunboostern (AIB) und die Behandlung von

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chronischen Erkrankungen während der Pandemie ermittelt werden. *Methode:* Während der Öffnungsphase nach dem Lockdown (Oktober 2020) wurde in den Distrikten Krishna und Darjeeling in Andhra Pradesh und Westbengalen, Indien, eine Querschnittsstudie durchgeführt. Dafür wurden 499 Personen, die an mindestens einer chronischen Krankheit litten, mithilfe eines strukturierten Fragebogens befragt. Der Zusammenhang von soziodemografischen Merkmalen, AIB und chronischen Erkrankungen mit pandemiebedingten Behandlungsproblemen wurde mittels logistischer Regression untersucht. Es erfolgte eine Hauptkomponentenanalyse, um die Dimensionalität der Faktoren im Zusammenhang mit den pandemiebedingten Behandlungsproblemen zu minimieren. *Ergebnisse:* Es wurden 499 Personen befragt. 91% gaben mindestens drei korrekte COVID-entsprechende Verhaltensweisen an. 92,2% hielten das Coronavirus für eine potenzielle Bedrohung (Mittelwert ± SD: 5,8 ± 2,6). 44,7% und 55,3% hatten eine bzw. zwei oder mehr chronische Erkrankungen. Die häufigsten Krankheiten waren Hypertonie (27,4%) und Diabetes mit Hypertonie (33%). Von den 499 Teilnehmern verwendeten 88,8% mindestens eine Form von AIB. 52% nahmen Ars. alb. in Kombination mit anderen AIB und 40% nahmen nur Ars. alb. Nur 9 Teilnehmer zogen sich eine COVID-19-Infektion zu. *Schlussfolgerung:* Die Einbeziehung einfacher und sicherer AYUSH-Maßnahmen ist im Interesse eines dicht besiedelten Landes wie Indien realistisch, ethisch vertretbar und wirtschaftlich. AYUSH-Maßnahmen als COVID-19-Prophylaxe und -Behandlung sowie als integrative Versorgung chronischer Erkrankungen wie NÜKs werden empfohlen.

Introduction

The World Health Organization designated the new coronavirus strain (SARS-COV-2) as COVID-19 and announced it to be a pandemic on March 11, 2020. It has affected 223 countries globally (until 28 February 2021), COVID-19 with cumulative cases per 100,000 people to be 1,427.30 and 2,470,772 deaths [1]. The risk of infection is higher in the elderly and those with pre-existing noncommunicable diseases (NCDs). Cardiovascular diseases, chronic respiratory disease (chronic obstructive pulmonary disease), diabetes, cancer, chronic kidney diseases are among the most suffered NCDs [2]. Hypertension (16.9%) was the most prevalent comorbidity in a Chinese study on 1,590 patients, followed by diabetes (8.2%) [3].

With 1,380 million people, India is the second-highest populated country [4]. Yet new cases and total mortality of COVID-19 are relatively low when compared to figures from many other countries [5]. India also has a high rate of patients with diabetes (10%) and hypertension (25%), both of which might exacerbate the COVID-19 outcomes [6]. India has high rates of tuberculosis (193 per 100,000) and pneumonia and houses one-third of the global slum population, making it impossible for them to maintain a safe social distancing due to their compromised economic and social circumstances. With this in context, the hospitalized cases in India are numerically low when compared with countries with better population indices [6, 7].

Wolf et al. [8] in their study on adults with chronic conditions observed 24.6% of participants were "very worried" about getting the coronavirus, 28.3% correctly identify symptoms or 30.2% could not tell the ways to prevent infection. While Pati et al. [9] in their community based found that individuals with multimorbidity experienced significantly higher care challenges than those with a single condition with notable disruption in treatment and routine check-ups. The most frequently cited concerns were physician consultation (43%), diagnostic services (26%), transport (33%), and mobility restrictions (21%).

India is a country with medical pluralism [10, 11]. Apart from modern medicine, the National Health Policy 2017 advocates mainstreaming the potential of AYUSH (Ayurveda, Yoga & Naturopathy, Unani, Siddha, Sowa Rigpa, and Homoeopathy) within a pluralistic system of Integrative healthcare [12]. With government funding and organized infrastructure through the Ministry of AYUSH, research has been given ample thrust [13]. Soon after the reported outbreak of COVID-19 in China [14], on the recommendation of the different focus groups, the Ministry of AYUSH [15, 16] issued an advisory on the use of AYUSH immune boosters (AIB) such as *Kadha*, consumption of golden milk (Ayurveda), *Arsenicum album* 30C (Homoeopathy) (Ars. alb.), herbal decoction (Unani), and practising Yoga to prevent COVID-19. India has launched its National Program for prevention and control of cardiovascular diseases, diabetes, cancer, and stroke (NPCDCS) in the year 2008, and later in the year 2015, the Ministry of AYUSH with its research councils collaborated and integrated with the Ministry of Health and Family Welfare, Govt. of India for screening, behavioural modification, treatment of people suffering from the identified NCDs covering 6 six districts across the country: three for Ayurveda, two for Homoeopathy, and one for Unani system of Medicine [17].

Homeopathy along with Yoga was implemented at two districts: Krishna District, Andhra Pradesh and Darjeeling District, West Bengal. In these districts, 16 AYUSH Lifestyle disorder clinics (ALSDC) were established at different healthcare levels such as district hospital/area hospital/rural hospital/community health centres. This present survey was undertaken on people suffering from NCDs and visiting these ALSDC to determine the impact of COVID-19 in managing their conditions during the

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pandemics, their current awareness, assessment of the seriousness of its threat, level of worry and concern related to contracting the virus, effect on a daily routine or existing plans, management of chronic conditions, usage of AIB and if affected with COVID-19 and their recovery.

Material and Methods

Study Design, Setting, and Participants

This cross-sectional study was conducted on the patients visiting ALSDC at Krishna and Darjeeling district for management of NCDs with Homeopathy, Lifestyle modification, and Yoga. As of September 30, 2020, these states had reported 35,312 cases, including 3,234 active, and 550 fatalities [18]. Patients aged 18 years and above participated in the study. It was conducted between 5 and 15 October 2020 (during the first wave), the time corresponding to the unlock down phase enquiring the knowledge, concern, bout COVID-19, about AIB and COVID care challenges during the past 12 weeks. The reporting in the paper follows STROBE guidelines for observational studies [19].

Sample Size and Sampling

A convenient sample of at least 30 patients per ALSDC totalling 499 patients for 16 ALSDC was assumed. The primary reason for such convenient sampling was the low-resource cost and feasibility, easing out potential data collection challenges at the pandemic time. The patients who were already enrolled in the integrated National NPCDCS project were contacted either over telephone or face-to-face interviews.

Data Collection Tool and Technique

A hybrid strategy that included both face-to-face (through written informed consent) and telephonic interview (verbal consent) was done as per the feasibility. All of the interviews were conducted under the guidance of the research team. Prior training was given to the data collection team and any queries regarding the questionnaire were resolved and clarified. A structured questionnaire was developed following the studies published by Wolf et al. [8] and Pati et al. [9]. Perceived concern for COVID-19 was evaluated by asking participants to rate, on a scale of 1–10 (1 being no threat at all and 10 being very serious), how worried are they about getting COVID-19 on a Likert scale (very worried to not worried at all) and how likely they or their relatives are going to get sick from COVID-19 on a Likert scale of very likely to not at all likely. Demonstrated knowledge of COVID-19 was assessed through open-ended questions asking participants to name 3 symptoms of the coronavirus and 3 actions that the government has recommended that they could take to avoid becoming infected. Knowledge, intake, and perceived attitude towards protection through AIB on Likert scale of very likely to not at all likely were also recorded. Self-rated physical, mental, and overall health was also assessed on a Likert scale of very good to very bad. The questionnaire of data collection is provided in online supplementary Appendix I (see www.karger.com/doi/10.1159/000521904 for all online suppl. material).

Statistical Analysis

The data were entered into a pre-designed spreadsheet and then transferred to SPSS ver. 20 (IBM SPSS, USA) for statistical analysis. Frequency (n) and percentage (%) were used for categorical variables and mean for quantitative variables. Associations between patient characteristics and responses to COVID-19 awareness, perceived concern, knowledge, and related behaviour items

Table 1. Sample characteristics (n = 499)

Variable	Summary value
Mean age	51.8±10.1
Age group	
30–45 years	149 (29.9)
46–60 years	244 (48.9)
61 years and above	106 (21.2)
Male:Female	238 (48):261 (52)
Rural: Urban	314 (63):185 (47)
Education	
Illiterate	73 (14.6)
Junior high school	133 (26.6)
High school	152 (30.4)
Graduate and above	141 (28.2)
Family environment	
Living along	6 (1.2)
Living spouse/family	493 (99.8)
Profession	
Farmers	85 (17.0)
Office job	57 (11.4)
Business/self-employed	99 (19.8)
Homemaker/retired	291 (51.6)
Morbidity	
Single morbidity	223 (44.7)
Multimorbidity	276 (55.3)
Number of chronic conditions	
1	223 (44.7)
2	227 (45.5)
≥3	49 (9.8)
Diseases suffered/pattern	
Hypertension alone	137 (27.5)
Diabetes alone	75 (15.0)
Chronic respiratory disease alone	16 (2.6)
Hypertension + diabetes	165 (33.1)
Hypertension + others	37 (7.4)
Hypertension + diabetes + others	37 (7.4)
Other combinations	35 (7.0)

were then examined in bivariate analyses using χ^2 tests, t tests, or analysis of variance, as appropriate. Principal component analysis was applied to transform seven co-related variables, which assessed routine care challenges during the pandemic into a smaller number of uncorrelated variables through the projection of eigenvectors of co-variance followed the method by Pati et al. [9]. AIB intake pattern was also estimated and graphically depicted. Logistic regression was undertaken to analyse the association of sociodemographic characteristics and multimorbidity status with care challenges; odds ratio, adjusted odds, 95% confidence interval for the association, and p value for the significance were obtained. Self-rated physical, mental, and overall health was assessed for multimorbidity and AIB using binary logistic regression. A p value of <0.05 was considered statistically significant.

Results

Table 1 shows the sample characteristics of the respondents. A total of 499 patients participated in the survey. Among the sample collected: 314 (62.9), 185 (47.1), be-

Table 2. Knowledge, attitudes, and self-reported behaviours towards COVID-19 and AIB

Item	Summary value
COVID-19 awareness and concern	
Mean response about seriousness of COVID-19 threat	5.8±2.6
How worried are you about getting the COVID-19	
Very worried	137 (27.5)
Somewhat worried	167 (33.5)
A little worried	93 (18.6)
Not worried at all	102 (20.4)
Do you think that you will get sick from the coronavirus	
I definitely will	30 (6)
I probably will	149 (29.9)
It's possible	173 (34.7)
Not at all	147 (29.5)
How likely do you think it is that you or someone you know may get sick from the coronavirus this year?	
Very likely	51 (10.21)
Somewhat likely	222 (44.5)
Not that likely	109 (21.8)
Not at all likely	117 (23.4)
COVID-19 Knowledge	
At least 3 sources of information related to COVID-19	
Yes:No	234 (46):265 (53)
Correctly identified 3 symptoms of COVID-19	
Yes:No	429 (86):70 (14)
Correctly identified 3 prevention methods for COVID-19	
Yes:No	455 (91.2):44 (8.8)
Do you know about AIB suggested by Govt. of India	
Yes:No	443 (88.8%):56 (11.2%)
Do you think AIB will benefit/protect you from COVID-19	
Very likely	226 (51.0)
Somewhat likely	195 (44.0)
Not at all likely /not sure	22 (5.0)
Related behaviours	
Number of AIB taken	443 (88.8)
1	204 (46.0)
2	154 (34.8)
≥3	85 (19.2)
In general, how would you rate your overall health today	
Very good	60 (12.0)
Good	245 (49.1)
Moderate	184 (36.9)
Bad	6 (1.2)
Very bad	4 (0.8)

longed to rural and urban areas, respectively, with a 100% consent rate. 225 (45%) and 274 (55%) had face-to-face interviews/telephonic interviews, respectively. The mean age of participants was 51 years with male:female is 48%:52%. 44.7% and 55.3% lived with one and 2 or more chronic conditions, respectively. Hypertension alone (27.5%) and diabetes with hypertension (33%) were leading presentations.

Knowledge

The knowledge, attitude and awareness, and concern are reflected in Table 2. Participants received information

about COVID-19 from television (462, 92.6%), friends (249, 49.9%), and newspaper (240, 48.1%). Only 46% received information from at least three sources. Ninety-one per cent identified at least three correct COVID-19 appropriate behaviour such as wearing a mask (498, 99.8%), social distancing (457, 91.6%), and hand washing for at least 20 s (421, 84.4%). Eighty-six per cent of the participants identified at least three symptoms of COVID-19. The three most identified symptoms were fever (461; 92.4%), dry cough (427; 85.6%), and shortness of breath (327; 66.9%). Regarding the government's suggestion about AIB, 443 (88.8%) had knowledge about AIB (shown in Table 2).

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Table 3. Awareness and concern and self-reported behaviours towards COVID-19

| Variable | Awareness and concern | | | Reported behaviour | | | | | |
| | mean seriousness of threat | worried | likely to get sick | daily routine | | physical activity | | diet | |
				no change	change	no change	change	no change	change
Age group									
30–45 years	5.66 (±2.75)	114 (28.7)	94 (26.7)	19 (12.8)	130 (87.2)	18 (12.1)	131 (87.9)	19 (12.8)	130 (87.2)
46–60 year	5.81 (±2.64)	194 (48.9)	178 (50.6)	33 (13.5)	211 (86.5)	35 (14.3)	209 (85.7)	33 (13.5)	211 (86.5)
61 years and above	5.99 (±2.38)	89 (22.4)	80 (22.7)	13 (12.3)	93 (87.7)	14 (13.2)	92 (86.8)	17 (16.0)	89 (84.0)
Gender									
Male	5.58 (±2.56)	181 (45.6)	161 (45.7)	33 (13.9)	205 (86.1)	32 (13.4)	206 (86.6)	**25 (10.5)***	**213 (89.5)**
Female	6.01 (±2.66)	216 (54.4)	191 (54.3)	32 (12.3)	229 (87.7)	35 (13.4)	226 (86.6)	44 (16.9)	217 (83.1)
Place									
Rural	**5.58 (±2.57)***	**240 (60.5)***	**205 (58.2)****	**27 (8.6)****	**287 (91.4)**	**33 (10.5)***	**281 (89.5)**	**28 (8.9)****	**286 (91.1)**
Urban	**6.18 (±2.66)***	**157 (39.5)**	**157 (41.8)**	**38 (20.5)**	**147 (79.5)**	**34 (18.4)**	**151 (81.6)**	**41 (22.2)**	**144 (77.8)**
Education									
Illiterate	**4.96 (±2.57)****	**53 (13.4)***	**35 (9.9)****	7 (9.6)	66 (90.4)	10 (13.7)	63 (86.3)	7 (9.6)	66 (90.4)
Junior high school	**5.35 (±2.69)****	**97 (24.4)**	**89 (25.3)**	19 (14.3)	114 (85.7)	16 (12)	117 (88)	15 (11.3)	116 (88.7)
High school	**6.15 (±2.53)****	**202 (50.9)**	**187 (53.1)**	30 (12.6)	208 (87.4)	34 (14.3)	204 (85.7)	35 (14.7)	203 (85.3)
Graduate and above	**6.53 (±2.44)****	**45 (11.3)**	**41 (11.6)**	9 (16.4)	46 (83.6)	7 (12.7)	48 (87.3)	12 (21.8)	43 (78.2)
Family environment									
Living along	5.33 (±3.50)	4 (1.0)	3 (0.9)	1 (16.7)	5 (83.3)	2 (33.3)	4 (66.7)	1 (16.7)	5 (83.3)
Living spouse/family	5.81 (±2.61)	393 (99)	349 (99.1)	64 (13)	429 (87)	65 (13.2)	428 (86.8)	68 (13.8)	425 (86.2)
Profession									
Farmers	**5.02 (±2.25)***	68 (17.1)	56 (15.9)	**7 (8.2)****	**78 (91.8)**	10 (11.8)	75 (88.2)	6 (7.1)	79 (92.9)
Office job	**6.25 (±3.10)**	42 (10.6)	39 (11.1)	**8 (14.0)**	**49 (86.0)**	9 (15.8)	48 (88.2)	9 (15.8)	48 (84.2)
Business/self-employed	**5.79 (±2.41)**	79 (19.9)	74 (21.0)	**26 (26.3)**	**73 (73.7)**	17 (17.2)	82 (82.8)	15 (15.2)	84 (84.4)
Homemaker and retired	**5.97 (±2.65)**	208 (52.4)	183 (52.0)	**24 (9.3)**	**234 (90.7)**	31 (12.0)	227 (88.0)	39 (15.1)	219 (84.9)
Number of chronic conditions									
Single morbidity	**5.39 (±2.6)****	**166 (41.8)***	**144 (40.9)***	**16 (7.2)****	**207 (92.8)**	**18 (8.1)****	**205 (91.9)**	**19 (8.5)****	**204 (91.5)**
Multimultimorbidity	**6.13 (±2.5)**	**231 (58.2)**	**208 (59.1)**	**49 (17.8)**	**227 (82.2)**	**49 (17.8)**	**127 (82.2)**	**50 (18.1)**	**226 (81.9)**

Values are presented in mean ± SD, n (%), one-way ANOVA was applied for parametric and χ^2 was applied for non-parametric data. Statistically significant values are shown in bold.
* $p \leq 0.01$. ** $p = 0.0001$.

Table 4. Response to AIB

Variable	Knowledge on AIB		χ²/p value	Attitude towards AIB		χ²/p value
	yes	no		likely to be benefitted	not benefitted	
Age group						
30–45 years	132 (88.6)	17 (11.4)	3.1; 0.207	125 (94.7)	7 (5.3)	0.06; 0.970
46–60 years	212 (86.9)	32 (13.1)		202 (95.3)	10 (4.7)	
61 years and above	99 (93.4)	7 (6.6)		94 (94.9)	5 (5.1)	
Gender						
Male	212 (89.1)	26 (10.9)	0.04; 0.840	201 (94.8)	11 (5.2)	0.04; 0.836
Female	231 (88.5)	30 (11.5)		220 (95.2)	11 (4.8)	
Place						
Rural	271 (86.3)	43 (13.7)	**5.19; 0.023**	257 (94.8)	14 (5.2)	0.05; 0.808
Urban	172 (93.0)	13 (7)		164 (95.3)	8 (4.7)	
Education						
Illiterate	54 (74.0)	19 (26.0)	**23.9; 0.0001**	48 (88.9)	6 (11.1)	**8.7; 0.032**
Junior high school	115 (86.5)	18 (13.5)		108 (93.9)	7 (6.1)	
High school	221 (92.9)	17 (7.1)		216 (97.7)	5 (2.3)	
Graduate and above	53 (96.4)	2 (3.6)		49 (92.5)	4 (7.5)	
Family environment						
Living along	5 (83.3)	1 (16.7)	0.18; 0.671	4 (80)	1 (20)	2.42; 0.120
Living spouse /family	438 (88.8)	55 (11.2)		417 (95.2)	21 (4.8)	
Profession						
Farmers	68 (80)	17 (20)	**10.25; 0.017**	65 (95.6)	3 (4.4)	0.86; 0.834
Office job	55 (96.5)	2 (3.5)		52 (94.5)	3 (5.5)	
Business/self-employed	89 (89.9)	10 (10.1)		83 (93.3)	6 (6.7)	
Homemaker and retired	231 (89.5)	27 (10.5)		221 (95.7)	10 (4.3)	
Number of chronic conditions						
Single morbidity	188 (84.3)	35 (15.7)	**8.09; 0.004**	179 (95.2)	9 (4.8)	0.02; 0.882
Multimorbidity	255 (92.4)	21 (7.6)		242 (94.9)	13 (5.1)	

Data presented in *n* (%). AIB, AYUSH immune boosters.

Awareness and Concern

Table 2 mentions the information about the awareness and concern of the participants. All the participants had heard of the coronavirus, and most (92.2%) considered it as a potential threat (mean ± SD: 5.8 ± 2.6). 397 (79.6%) said that they were "worried" about getting the coronavirus, and 20.4% were not worried at all. Few participants believed that they would definitely (6%) or probably (29.9%) get the coronavirus, whereas 34.7% and 29.5% selected possible or not getting at all, respectively. The percentage of likely getting sick with COVID-19 by the participant or one of the relatives was also similar: very likely (10.2%), somewhat likely (44.5%), not that likely, or not at all likely 45.2%. Univariate analysis of variance (ANOVA) reflected a similar rating for the seriousness of the COVID-19 threat among the age groups ($p = 0.60$) and gender ($p = 0.06$). Respondents' ratings of the seriousness significantly differed with more concern among urban residents ($p = 0.01$), with higher education (graduation and above), doing a job ($p = 0.01$), and with more than one chronic condition (multimorbidity) ($p = 0.0001$). However, rural participants, education of high school and above and with multimorbidity were worried, and thought they would likely to get sick ($p = 0.0001$) (shown in Table 3).

Behaviour towards AIB

Fifty-six participants did not take any AIB. Table 4 shows association of socio-demographics and disease pattern with knowledge and attitude towards AIB. Participants residing in urban areas (93%, $p = 0.023$), having higher education (96.4%, $p = 0.0001$), office job (96.5%, $p = 0.01$), and with multimorbidity (92.4%, $p = 0.004$) had knowledge about AIB. Out of 443 participants, 95% ($n = 421$) believed in getting benefits from AIB. Participants who were educated had association for their belief ($p = 0.032$), while no association was found among different age groups ($p = 0.97$), profession ($p = 0.83$), gender ($p = 0.83$), place of residence ($p = 0.80$), suffering from single/multimorbidity ($p = 0.88$), living alone/spouse ($p = 0.12$), and different professions ($p = 0.83$) (Table 4). Out of 499 participants, 88.8% of participants had at least one form of AIB. Among them, Ars. alb. with other AIB was consumed by (52%) and Ars. alb. alone by 40%. 13.9% consumed Ayurveda kadha alone or in combination with
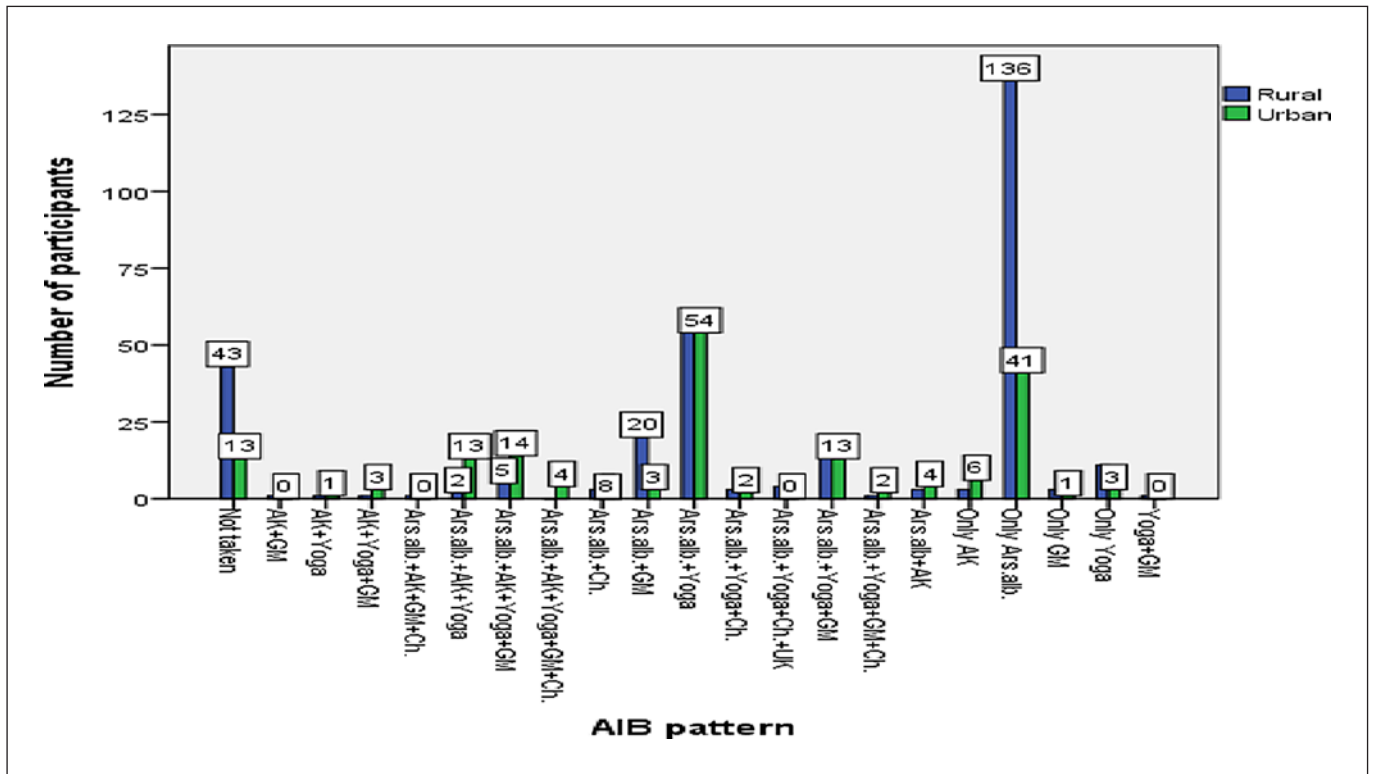
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Fig. 1. Pattern of intake of AYUSH Immune boosters. AK, Ayurveda kadha; GM, Golden milk; Ch., Chwanprash; UK, Unani kadha.
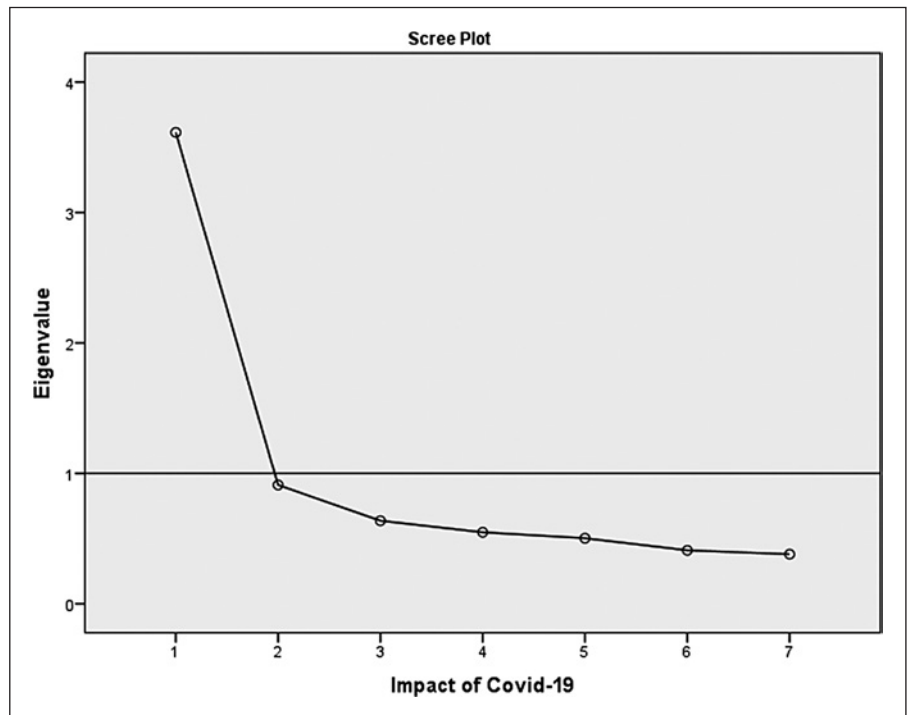

Fig. 2. Scree plot of eigenvalues after principal component analysis.

other AIB. Similarly, Yoga practice with other AIB, consumption of Golden milk with other AIB, Chyawanprash with other AIB, Unani decoction was taken by 47.5%, 19.8%, 6.3%, 0.9%, respectively. The pattern of AIB taken is given in Figure 1.

Challenges in Daily Routine and Chronic Care during the Pandemic

The participants reported challenges across all dimensions in the disease management behaviours in the past 12 weeks. 33% (*n* = 166) informed that the pandemic has

Table 5. Association of socio-demographic characteristics, AIB, and morbidity with care challenges

Characteristics	No significant challenge in care (N = 249), n (%)	Significant challenge in care (N = 250), n (%)	OR [95% CI]	p value	AOR [95% CI]	p value
Sex						
Female (Ref.)	133 (51.0)	128 (49.0)				
Male	116 (48.7)	122 (51.3)	1.09 [0.77, 1.55]	0.621	3.81 [2.04, 7.11]	**0.0001**
Age group in years						
≤45 years (Ref.)	72 (48.3)	77 (51.7)				
46–60 years	116 (47.5)	128 (52.5)	1.03 [0.69, 1.55]	0.880	1.02 [0.63, 1.64]	0.943
>60 years	61 (57.5)	45 (42.5)	0.69 [0.42, 1.14]	0.147	0.38 [0.20, 0.72]	**0.003**
Residence						
Rural	144 (45.9)	170 (54.1)	1.55 [1.08, 2.23]	**0.019**	1.89 [1.21, 2.96]	**0.006**
Urban (Ref.)	105 (56.8)	80 (43.2)				
Education						
No formal schooling	26 (35.6)	47 (64.4)	1.21 [0.59, 2.48]	0.612	1.36 [0.51, 3.60]	0.537
Junior High School	73 (54.9)	60 (45.1)	0.55 [0.29, 1.04]	0.065	0.44 [0.20, 0.99]	**0.048**
High school	128 (53.8)	110 (46.2)	0.57 [0.32, 1.04]	0.067	0.49 [0.23, 1.04]	0.062
Graduation and above (Ref.)	22 (40.0)	33 (60.0)				
Occupation						
Homemaker/student/retired employee	117 (45.3)	141 (54.7)	2.35 [1.29, 4.29]	**0.005**	2.57 [1.25, 5.21]	**0.010**
Farmers	41 (48.2)	44 (51.8)	3.24 [1.65, 6.39]	**0.001**	3.62 [1.58, 8.29]	**0.002**
Office job	23 (40.4)	24 (59.6)	2.64 [1.62, 4.32]	**0.0001**	7.54 [3.57, 15.93]	**0.0001**
Business/self-employed (Ref.)	68 (68.7)	31 (31.3)				
Family environment						
Living alone (Ref.)	3 (50.0)	3 (50.0)				
Living with spouse/family	246 (49.9)	247 (50.1)	1.00 [0.20, 5.02]	0.996	1.09 [0.15, 7.81]	0.933
Morbidity						
Single (Ref.)	104 (46.6)	119 (53.4)				
Multimorbidity	145 (52.5)	131 (47.5)	0.79 [0.55, 1.12]	0.190	0.74 [0.49, 1.12]	0.149
AIB						
Single (Ref.)	112 (54.9)	92 (45.1)				
Multiple	108 (45.2)	131 (54.8)	1.47 [1.01, 2.15]	**0.042**	1.62 [1.04, 2.52]	**0.032**

Bold indicates statistically significant.

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Table 6. Self-reported health

Pattern	Self-rated overall health		Self-rated physical health		Self-rated mental health	
	good	bad	good	bad	good	bad
AIB taken (*n* = 443)						
Single	135	69	122	82	116	88
Multiple	145	94	140	99	137	102
	OR = 1.26 (0.8, 1.8)		OR = 1.05 (0.7, 1.5)		OR = 0.98 (0.6, 1.4)	
	p = 0.23		*p* = 0.79		*p* = 0.92	
Multimorbidity (*n* = 499)						
Present	167	109	163	113	156	120
Absent	138	85	122	101	123	100
	OR = 1.05 (1.32, 3.0)		OR = 0.83 (0.58, 1.19)		OR = 0.94 (0.66, 1.35)	
	p = 0.78		*p* = 0.32		*p* = 0.76	

affected their long-term disease care very much and 29% (*n* = 146) reported their daily routine being affected very much. 30% reported very much changes in physical activity, 37% in the diet, 40.5% in the continuity of treatment, 45.9% reported deviations in the physician consultation, and 32.3% reported changes in their routine investigations and health check-ups (e.g., blood pressure). There was no differences among age groups (*p* > 0.05), family environment (*p* > 0.05), and education (*p* > 0.05) concerning changes in daily routine, physical activity, and diet (shown in Table 3). However, the rural participants were affected in all the dimensions compared to the urban residents (*p* < 0.05) (shown in Table 3). Further with regards to their experiences during the past 12 weeks, the participants reported as follows: very much need to consult a doctor (29.3%), very much need to visit a hospital (31.3%), very much difficulty in getting the medicine (45.1%), very much difficulty in getting investigations done (30.7%), very much difficulty in day care procedures like physiotherapy, dialysis, etc. (37.1%), very much difficulty in getting emergency care (38.5%), difficulty in reaching a hospital or day care (34.5%).

After principal component analysis, out of 499 participants, 250 (50.2%) participants were found to have care challenges having above the median value, and 249 (49.8%) had below or equal to median scores. An eigenvalue for each component was presented in the screen plot (Fig. 2). Components with eigenvalues more than 1 were extracted. The first component explains 51.6% of total variance; when considering the first two components, the cumulative variance was 64% (online suppl. Appendix II).

The association of socio-demographic characteristics, AIB and morbidity conditions with care challenges during the pandemic, is presented in Table 5. The male respondents reported greater care challenges than females (51.3% vs. 49.0%). The perceived care challenges were significantly higher among age group 46–60 years (52.5%),

rural dwellers (54.1%), no formal schooling (64.4%), office going people (59.6%), and residing alone or separately from family members (50%). On univariate logistic regression, rural residents (OR = 1.55), homemakers/retired employee/students (OR: 2.35), farmers (OR: 3.24), office jobs (OR: 2.64), and taking Multiple AIB (OR = 1.47) were found to have significant care challenges. Similar findings were seen in multivariable regression with the probability of reporting care challenges being higher in males than their female counterparts (AOR = 3.80, 95% CI = 2.04, 7.10, *p* = 0.0001) and with different professions. Individuals taking multiple AIB were more likely to have significant care challenges than those who had single AIB (AOR = 1.62, 95% CI = 1.04, 2.52, *p* = 0.032).

Overall Health

The self-rated overall health was very good (12%, *n* = 60), good (49.1%, *n* = 245), moderate (36.9%, *n* = 184), bad (1.2%, *n* = 6), and very bad 3 (0.6%). Further, the participants who took either single AIB or multiple AIB showed no significant association in either overall (OR = 1.26, *p* = 0.23), physical (OR = 1.05, *p* = 0.79), or mental health (OR = 0.98, *p* = 0.92) (shown in Table 6). There was no difference in their self-rated health depending on their morbidity status (OR = 1.05 [1.3, 3.0]) for overall health and is similar for physical and mental health (shown in Table 6). Out of 499 participants, only 9 got infected with COVID-19 among these 8 were symptomatic and 1 was asymptomatic. All the positive cases with each 3 of them were treated in-home, quarantine centre, and hospital, respectively. Four participants recovered fully healthy and 4 recovered with some sort of sequelae. Three participants had taken single AIB (01 Ayurvedic Kadha, 02 *Ars. alb*. 30) and three had Multiple AIB (01 *Ars. alb*. + Yoga + Golden Milk, 01 *Ars. alb*. + Golden Milk, 01 *Ars. alb*. + Chwanprash). All the participants recovered, and no death was reported.

Discussion

COVID-19 pandemic has created new obstacles for healthcare care providers with implications for patient care particularly for people living with NCDs. This cross-sectional survey conducted during the un-lockdown period on 499 adults with chronic health conditions determined their knowledge, concern, behaviour about CO-VID-19 and intake of AIB propagated by Ministry of AYUSH, Govt. of India. The respondents viewed the CO-VID-19 outbreak to be of serious concern. Wolf et al. [8] in their study found the rating of threat to be 9 ± 1.7 whereas in this study the rating was 5.8 ± 2.6. The study shows that 79.6% are worried about the COVID-19 disease which is similar to the findings of Wolf et al. [8] at 87%. This may be due to the timing of the study in India, i.e., during the unlock down period wherein more awareness was created due to the Indian government's wide circulation and awareness drive about the pandemic.

According to Gummidi et al. [20] study on the continuum of care for NCDs during the COVID-19 pandemic in rural India, 68% of the participants had adequate knowledge of symptoms of COVID-19, while 43% were not aware of the mode of transmission of the virus. In this study, 86% correctly identified at least 3 symptoms and 91% identified 3 methods of prevention. This may be due to the period of surveying with temporal effect. Multimorbidity was prevalent in 55.3 per cent of the respondents who suffered from two or more diseases. The prevalence is similar to the findings of Pati et al. [9].

Accessing essential healthcare has been challenging in many places in India as the public transport system has not been available for patients as well as for healthcare workers to access health facilities [21]. Pati et al. [9] in their study reported different challenges of people suffering from NCDs such as physician consultation (43%) followed by diagnostic investigations (26%), transport logistics (33%), financial arrangements (26%), mobility restrictions (21%), and fear of going to hospital owing to the risk of contagion (18%). In our study, though conducted during unlock down period had similar findings such as physician consultation (29.3%), visiting a hospital (31.3%), getting the medicine (45.1%), getting investigations done (30.7%), difficulty in daycare procedures like physiotherapy, dialysis, etc. (37.1%), difficulty in getting emergency care (38.5%), difficulty in reaching a hospital or daycare (34.5%). These findings reflect the persistence of fear towards the COVID-19 disease.

The burden of NCDs in general and multimorbidity in particular can be leveraged through AYUSH systems, and a strategy to tackle this global burden is urgently needed. Building human resources for health has been an important domain in resource-poor settings [22]. With the public health advisory by Ministry to promote AYUSH medicines as immune boosters [23] health personnel at the state level campaigned and distributed AIB. Wide advisory through television, radio, and social media created awareness among the masses for the consumption of AIB. From the sample of 499, 88.8% of the participants knew AIB. Among them, 95% of the participants informed likely to benefit from taking it to protect themselves from COVID-19. 443 participants had taken AIB and the most frequently used AIB was *Ars. alb.* either in single (40%) or in combination (52%) with other AIBs. This survey also evaluated the overall health of the participants who were already under AYUSH treatment. 98.2% of participants rated their health as good, very good, or moderate whereas only 2% rated as bad or very bad. The COVID-19 pandemic has prompted the involvement of different health systems in fighting the disease. These systems were also effective in other infectious diseases such as encephalitis, thrombocytopenia due to dengue, chikungunya, influenza-like illness [24–29]. Thus, the AYUSH systems require government focus in the battles to prevent and treat different diseases [30].

Future Implication and Conclusion

AYUSH system focuses on a holistic approach in the management of disease [31]. AYUSH care utilization is higher among patients with chronic diseases [32]; however, much less is studied on multimorbidity and what constitutes "best care" for these patients. Areas for potential investigation of multimorbidity fall primarily into three categories defining and categorizing the population; developing the tools needed to explore multimorbidity and its consequences; and using these tools to investigate promising processes of care [33]. The National Health Policy 2017 advocates "medical pluralism" and re-emphasizes the need for integrating AYUSH in the National Health Mission, research and education [34]. Multimorbidity will be a major problem bringing a gross health burden to a nation. Holistic treatment approaches here AYUSH systems if added can bring down the cost of care, reduce polypharmacy, and improve quality of life [32, 35]. Pati et al. [9] stated, "The observed higher presence of multimorbidity in younger population requires tailored health advisories harnessing on digital and traditional communication with stringent compliance to CO-VID-19 protection measures." AYUSH systems are suggested in the integrative approach and larger public benefit [36].

Conclusion

In the interest of a densely populated country like India, the inclusion of simple and safe AYUSH measures is realistic, ethical, and cost-effective. AYUSH interven-

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tions as COVID-19 prophylactic and treatment as well as integrative care of chronic illnesses such as NCDs is suggested.

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Statement of Ethics

Ethical clearance was obtained from the 24th Central Ethics Committee of Central Council for Research in Homoeopathy (Ref. No.1-3/2019-20/CCRH/Tech./24EC/2493 dated 24 September 2020). Necessary measures were taken to ensure confidentiality and anonymity of patients. The study registered at CTRI-India-CTRI/2020/09/028132.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

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Author Contributions

R.V. and D.N. conceptualized the study and final version was approved by all authors. G.C. and R.C. responsible for data collection, A.K. and R.V. conducted the statistical analysis. R.V. drafted the first version of the manuscript with relevant suggestions from D.N., G.C., R.C., P.O., A.K., and A.K. All the authors approved the version submitted for publication.

Data Availability Statement

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

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